

**CLAIMS**

1. **A Novel Laser Bruting Machine** consist of (i) diamond holder 8 (ii) Setup device 3, & (iii) processing device 4; diamond holder 8 consist of stitching die 6, magnetic die 7 and rough diamond 5; setup device 3 consist of CNC interface, video system; Processing device 4  
5 consists of CNC interface, heat exchanger 25, video system, beam delivery mechanism 26, laser source 27, RF-Q Switch driver 28 ,power supply 29 & stabilizer.
2. **A Novel Laser Bruting Machine** as claimed in claim 1 wherein rough diamond 5 is stitched on the top of stitching die 6 by adhesive & heat; stitching die 6 along with rough diamond b is fixed on top of magnetic die 7.
- 10 3. **A Novel Laser Bruting Machine** as claimed in claim 1 wherein CNC interface of setup device 3 consists of motorized X axis positioner 9, motorized rotatable platform 11, motorized up/down positioner 12, drive cards 13,14,15, control card, computer 16, monitor 19, three stepper motors, drive card power supply 22.
4. **A Novel Laser Bruting Machine** as claimed in claims 1,3 wherein motorized X axis  
15 positioner 9, motorized rotatable platform 11, motorized up/down positioner b are driven by stepper motors.
5. **A Novel Laser Bruting Machine** as claimed in claims 1,3 wherein one end of drive cards 13, 14 & 15 are connected to motorized X-axis positioner 9, motorized up/down positioner 12 & motorized rotatable platform 11 respectively & other end of drive cards 13,14,15 connected to  
20 drive card of computer 16 through 37pin connector ;drive cards 13,14,15 are connected to drive card power supply 22.
6. **A Novel Laser Bruting Machine** as claimed in claims 3,4,5 wherein motion of motorized X axis positioner 9, motorized rotatable platform 11, motorized up/down positioner 12 is controlled by drive card placed in computer 16; limit switches are provided to each end of  
25 motorized X axis positioner 9, motorized rotatable platform 11, motorized up/down positioner

12 to sense the home & end position.

7. **A Novel Laser Bruting Machine** as claimed in claim 1 wherein video system of setup device 3 is connected to computer 16 & it consists of Upper CCD camera 17 & Lower CCD Camera 18.

5 8. **A Novel Laser Bruting Machine** as claimed in claim 1 wherein CNC interface of processing device 4 consists of motorized Y-axis positioner 30, motorized rotatable platform 23, motorized X axis positioner 31, computer 21, monitor 24, CCTV 32, Y drive card 33, X drive card 34, R drive card 35, drive card power supply 36, three stepper motors, control card.

10 9. **A Novel Laser Bruting Machine** as claimed in claim 8 wherein motorized Y-axis positioner 30, motorized rotatable platform 23, motorized X axis positioner 31 are driven by stepper motors.

10. **A Novel Laser Bruting Machine** as claimed in claims 8,9 wherein one end of Y drive card 33, R drive card 35 & X drive card 34 are connected to motorized Y-axis positioner 30, motorized rotatable platform 23, & motorized X axis positioner 31 respectively and other end of Y drive card 33, R drive card 35, X drive card 34 are connected to control card of computer 21 through 37 pin connector; Y-drive card 33, X drive card 34, R drive card 35 are connected to drive card power supply 36.

11. **A Novel Laser Bruting Machine** as claimed in claim 8 wherein motion of motorized Y-axis positioner 30, motorized rotatable platform 23, motorized X axis positioner 31 are controlled by control card of computer 21.

12. **A Novel Laser Bruting Machine** as claimed in claim 8 wherein displacement of rough diamond 5 of diamond holder 8 via motorized rotatable platform 23 on Y-axis and X-axis is accomplished by motorized Y-axis positioner 30 and motorized X-axis positioner 31 respectively; motorized Y-axis positioner 30 and motorized X-axis positioner 31 are mounted

in such a way that motorized Y-axis positioner 30 can travel on motorized X-axis positioner 31.

13. **A Novel Laser Bruting Machine** as claimed in claim 8 wherein limit switches are provided to each end of Motorized Y axis positioner 30 , Motorized X axis positioner 31 & motorized rotatable platform 23 to sense the home & end position.
14. **A Novel Laser Bruting Machine** as claimed in claim 1 wherein video system of processing device 4 is connected to computer 21 & it consist of upper CCD camera 52 and lower CCD camera 53.
15. **A Novel Laser Bruting Machine** as claimed in claim 1 wherein heat exchanger 25 of processing device 4 is connected to power supply 29 and RF Q-switch driver 28; digital temperature controller 72, LED's 49,50,51 of interlock controller for flow, level & temperature indication of de-ionized water, pump on/off knob 62, pump LED 63 are accommodated in heat exchanger 25.
16. **A Novel Laser Bruting Machine** as claimed in claims 1,15 wherein heat exchanger 25 consist of cooling system 37, chilling system 38; cooling system 37 circulates de-ionized water while chilling system 38 circulates water; In cooling system 37 IN port 74 of heat exchanger 25 is connected to one end of Teflon connector 75 via hose pipe 82 while other two ends of Teflon connector 75 are connected to OUT port 76 of laser head 43 and OUT port 77 of Q-switch 42 via hose pipes 83,84 respectively; OUT port 78 of heat exchanger 25 is connected to one end of Teflon connector 79 via hose pipe 85 while other two ends of Teflon connector 79 are connected to IN port 80 of laser head 43 and IN port 81 of Q-switch 42 via hose pipes 86,87 respectively; chilling system 38 consist of chilling pump system 48; chilling pump system 48 consist of split tank 71, chilling water tank 70; digital temperature controller 73 is connected to chilling water tank 70; chilling OUT port 88 & chilling IN port 94 of heat exchanger 25 are connected to chilling pump system 48; chilling OUT port 88 of

- heat exchanger 25 is connected to IN port 89 of chilling water tank 70 via hose pipe 95 and OUT port 90 of chilling water tank 70 is connected to IN port 91 of split tank 71 via hosepipe 96. OUT port 92 of split tank 71 is connected to dual port 93 of chilling water tank 70 via hose pipe 97 and other end of dual port 93 of chilling water tank 70 is connected to chilling IN port 94 of heat exchanger 25 via hose pipe 98.
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17. **A Novel Laser Bruting Machine** as claimed in claim 1 wherein Beam delivery mechanism 26 of processing device 4 consists of Bruting process system 54, Girdle polishing system 55.
18. **A Novel Laser Bruting Machine** as claimed in claim 17 wherein Bruting process system 54 consists of sliding beam bender 56, lower beam bender 57, lower focusing device 58.
- 10 19. **A Novel Laser Bruting Machine** as claimed in claims 17,18 wherein Girdle Polishing system 55 consist of upper beam bender 59, upper focusing device 60; Sliding beam bender 56, lower beam bender 57 and upper beam bender 59 are placed at 45° with respect to incoming laser beam; each of the beam benders 56,57,59 bends the laser beam at 90°; Lower focusing device 58 and upper focusing device 60 focuses the incoming laser beam; Lower focusing device 58 and upper focusing device 60 have illuminating source to illuminate rough diamond 5; Each illuminating source of lower focusing device 58 & upper focusing device 60 have plurality of LED's.
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20. **A Novel Laser Bruting Machine** as claimed in claim 1 wherein laser source 27 consist of back mirror 40, apertures 41, 41, Q-switch 42, laser head 43, shutter 44, polariser 45, front mirror 46 & beam expander 47.
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21. **A Novel Laser Bruting Machine** as claimed in claim 1 wherein RF Q Switch driver 28 is connected to computer 21, Q- Switch 42 & heat exchanger 25.
22. **A Novel Laser Bruting Machine** as claimed in claim 1 wherein stabilizer is connected to power supply 29; T.P. switch 64, Laser lamp on/off toggle switch 65, current setting unit 68, push button on/off switch 67 of current setting unit 68, current variable knob 69 are provided
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**AMENDED CLAIMS**

[received by the International Bureau on 11 March 2004 (11.03.04);  
original claim 24 cancelled;  
remaining claims unchanged (1 page)]

to power supply 29.

23. A Novel Laser Bruting Machine as claimed in claims 3,8,17 wherein computers 16&21 are connected by LAN and the computer program for bruting process system 54 & girdle polishing system 55 is substantially described in flow chart in accompanying figure.

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to power supply 29.

23. A Novel Laser Bruting Machine as claimed in claims 3,8,17 wherein computers 16&21 are connected by LAN and the computer program for bruting process system 54 & girdle polishing system 55 is substantially described in flow chart in accompanying figure.
- 5 24. A Novel Laser Bruting Machine substantially herein described with reference to the foregoing description and the accompanying drawings.

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